

WHAT IS CLAIMED IS:

1. An apparatus for charging toner particles prior to being delivered to a development delivery device, comprising:

a blower for generating an airborne stream in a chamber;

a dispenser for dispensing toner particles in the airborne stream so that the toner particles are entrained in the airborne stream in the chamber;

means for subjecting the airborne stream of toner particles to unipolar gas ions at an ion charging zone in said chamber, said subjecting means includes subjecting includes: a first charging device, positioned on a wall of said chamber in said ion charging zone, for charging the airborne stream of toner particles with; and a second charging device opposed from said first charging device so that the airborne stream of toner particles transported to the ion-charging zone between the first charging device and the second charging device.

2. The apparatus according to claim 1, wherein the subjecting means uniformly charges irregular or spherical shaped toner particles in the airborne stream to a Pauthenier charging limit.

3. The apparatus according to claim 1, further comprising a power source for applying a first AC voltage bias to the first charging device.

4. The apparatus according to claim 3, wherein the power source applies a second AC voltage bias to the second charging device to generate an applied alternating electric field in said ion charging zone to prevent toner particles from the airborne stream of toner particles from accumulating on said first charging device and second charging device.

5. The apparatus according to claim 4, wherein the second AC voltage bias to the second charging device is 180 degrees out of phase from the first AC voltage.

6. The apparatus according to claim 1, further comprising means for collecting the charged toner particles in a collection area to be subsequently delivered to the development delivery device.

7. The apparatus according to claim 1, wherein the first charging device and the second device includes a scorotron having a screen grid and a corona emitting electrode.

8. The apparatus according to claim 7, wherein the screen grid of the first charging device is about 8 mm from the screen grid of the second charging device.

9. The apparatus according to claim 1, wherein the ion-charging zone is about 2.9 cm long.

10. The apparatus according to claim 1, wherein the power source applies voltage of about 8 kV peak.

11. An electrostatic printing machine having an apparatus for charging toner particles prior to being delivered to a development delivery device, comprising

a blower for generating an airborne stream in a chamber;

a dispenser for dispensing toner particles in the airborne stream so that the toner particles are entrained in the airborne stream in the chamber;

means for subjecting the airborne stream of toner particles to unipolar gas ions at an ion charging zone in said chamber, said subjecting means includes subjecting includes: a first charging device, positioned on a wall of said chamber in said ion charging zone, for charging the airborne stream of toner particles with; and a second charging device opposed from said first charging device so that the airborne stream of toner particles transported to the ion-charging zone between the first charging device and the second charging device.

12. The apparatus according to claim 11, wherein the subjecting means uniformly charges irregular or spherical shaped toner particles in the airborne stream to a Pauthenier charging limit.

13. The apparatus according to claim 11, further comprising a power source for applying a first AC voltage bias to the first charging device.

14. The apparatus according to claim 13, wherein the power source applies a second AC voltage bias to the second charging device to generate an applied alternating electric field in said ion charging zone to prevent toner particles from the airborne stream of toner particles from accumulating on said first charging device and second charging device.

15. The apparatus according to claim 14, wherein the second AC voltage bias to the second charging device is 180 degrees out of phase from the first AC voltage.

16. The apparatus according to claim 11, further comprising means for collecting the charged toner particles in a collection area to be subsequently delivered to the development delivery device.

17. The apparatus according to claim 11, wherein the first charging device and the second device includes a scorotron having a screen grid and a corona emitting electrode.

18. The apparatus according to claim 17, wherein the screen grid of the first charging device is about 8mm from the screen grid of the second charging device.

19. The apparatus according to claim 11, wherein the ion-charging zone is about 2.9 cm long.

20. The apparatus according to claim 11, wherein the power source applies voltage of about 8 kV peak.